

## A Sibling Precedence Approach to the Linearization of Multiple Dominance Structures

DAVID POTTER

*Simon Fraser University*

### 1 Introduction

A current trend in syntactic theory explores of the use of multiple dominance structures in the analysis of right-node raising and across-the-board movement, as well as in the formal description of movement. One effect of the introduction of multiple dominance structures is the complication of the mapping of syntactic structure to strings of terminals, as the multiply dominated element has syntactic dependencies in more than one location. In this paper, I propose that the nontangling condition of Partee et al. (1990) can be revised to permit the linearization of a range of multiple dominance structures. In addition, this revised nontangling condition restricts the possible configurations of multiple dominance structures and predicts a peripherality condition in sharing coordination constructions: elements shared between conjuncts must appear at the periphery of those conjuncts.

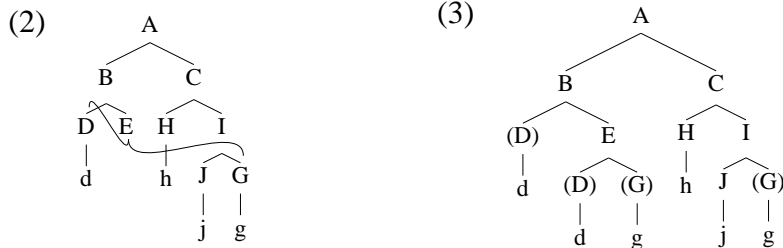
In across-the-board movement, an element appearing at the left periphery of a coordinate structure appears to have syntactic and semantic dependencies in both conjuncts. In (1) *Alexi* is the subject of, and *should* is the modal for, both *brine* and *bard*. *Alexi* can be said to be shared between the conjuncts. Right node raising constructions reflect a rightward mirroring of across-the-board movement. In (1), *the turkey* and *for Thanksgiving* are shared between the conjuncts.

- (1) **Alexi should** brine and bard **the turkey for Thanksgiving**.

The *prima facie* similarity between these two constructions has lead several authors to the claim that they are derived from a single underlying mechanism (Wilder 2008; Vries 2009). I will refer to these constructions collectively as sharing coordination constructions and reserve the terms left sharing constructions for across-the-board movement and right sharing constructions for right node raising. While the analysis of sharing coordination constructions remains a topic of much debate, one

approach that has garnered significant attention is the multiple dominance analysis (Wilder 2008, Vries 2009, Gracanin-Yukse To appear).

In multiple dominance analyses, shared elements are literally present in both conjuncts simultaneously. These elements have at least two parents; one at each site of syntactic dependency. Nodes that have more than one parent are said to be multiply dominated, in contrast to singly dominated nodes, which have a single parent. In (2), the nodes D and G are multiply dominated. Note that the children of multiple dominated parents are not necessarily multiply dominated; d and g are not multiply dominated themselves, as each has exactly one parent. In future examples, for reasons of space and clarity, (2) will be equivalently depicted as (3), in which a copy of every subtree rooted by a multiply dominated node will be included as child to each of the multiply dominated node's parents.

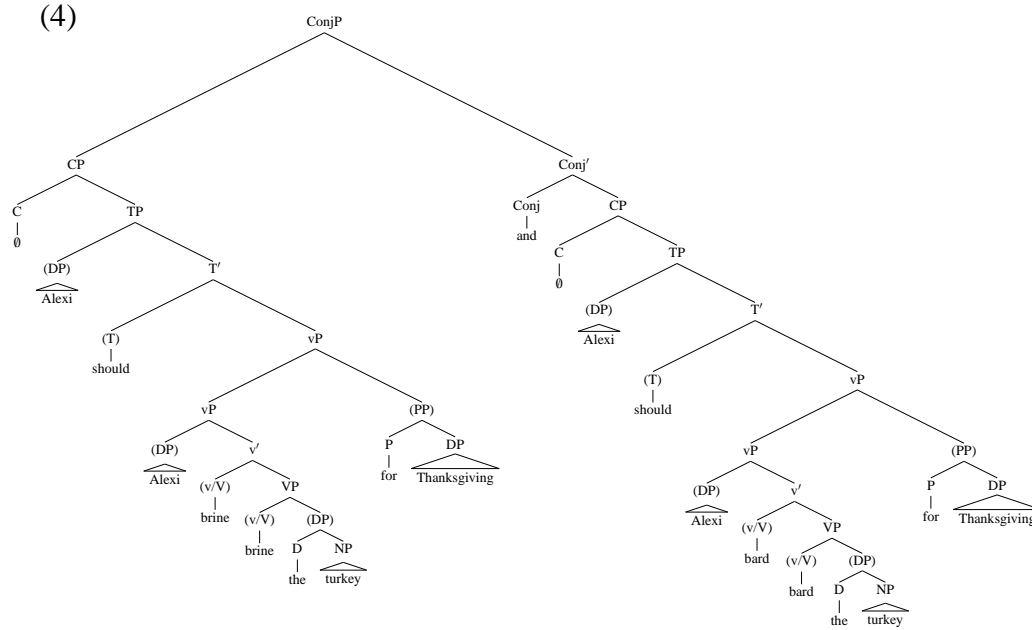


Multiple dominance structure has also been applied beyond sharing coordination constructions, to the formal description of movement (Nunes 2001, Starke 2001, Vries 2009). In these analyses, a moved element is not copied or moved. Instead, a new dominance relation is added to the ‘moved’ node. As a result, the ‘moved’ node acquires a new parent at the target site in addition to its original dominance relations. In the case of head movement, I will represent the category of the head as  $X/Y$  where  $X$  and  $Y$  are the head categories.

Under such a multiple dominance analysis, the shared elements in (1), *Alexi, should, the turkey, for Thanksgiving* are present in both conjuncts. The shared subject DP *Alexi*, for example, is child to the *TP* in each conjunct. Assuming the internal subject hypothesis, the DP *Alexi* is also dominated by each *vP* node. Thus, the DP *Alexi* has a total of four parents.

Finally, for concreteness, I also make several assumptions about the nature of the coordinate structures involved in sharing coordination constructions. Specifically, I will assume that the coordinator *and* is the head of an asymmetric functional projection *ConjP* (Johannessen 1998), that the conjuncts involved are full CPs, i.e. the *large conjunct hypothesis*, following Wilder (1997), and that the shared elements are located in their canonical positions within these conjuncts, i.e. an *in situ* analysis. Thus I am assuming the structure presented in (4) for the analysis of (1). With the exception of asymmetric coordination, these assumptions are simply for concreteness and exposition. I describe in the last section how the analysis presented here is compatible with other assumptions about the structure of sharing

coordination constructions.



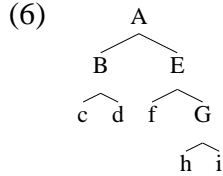
Once multiple dominance structures are admitted, the theory must account for the problem of linearization – the formal characterization of the relationship between multiple dominance structures and the precedence relations of the terminal nodes in these structures. Because a multiply dominated element has two (or more) parents, but is only pronounced once, it is not evident what dictates where the element is to be pronounced. For example, in (4), it is not intuitive why *Alexi* should be pronounced in the left conjunct before *should*, or why *the turkey* should be pronounced after *bard* instead of immediately after *brine*. I will call the mechanism which dictates precedence relations between terminals on the basis of syntactic structure a linearization algorithm.

## 2 The Nontangling Condition

Partee, ter Meulen, and Wall define a linearization algorithm based on a number of relations between nodes and conditions on structure, which yields precedence relations between terminals in any well-formed, linearizable syntactic structure (Partee et al. 1990). However, one of the structural conditions, the nontangling condition, excludes just the types of structure we are concerned with here: multiple dominance structures.

The two principal syntactic structure relations defined by Partee et al. are dominance and precedence. Dominance and the related relation immediate dominance are given in (5). In (6), node *E* immediately dominates nodes *f*, *G*, and *E*, while dominating nodes *f*, *G*, *h*, *i*, and *E*. It will be helpful to talk about the “connected sequence of branches”; I will call such a sequence a *path*, following Wilder (2008).

- (5) a. **Dominance:** A node  $x$  dominates a node  $y$  if there is a connected sequence of branches in the tree extending from  $x$  to  $y$ .  
 b. **Immediate Dominance:** A node  $x$  immediately dominates a node  $y$  if there is no distinct node between  $x$  and  $y$ .



Partee et al. also define the precedence relation between nodes in a tree. The precedes symbol,  $\prec$ , denotes precedence: the expression  $x \prec y$  indicates that  $x$  precedes  $y$ . Precedence and dominance are mutually exclusive, which Partee et al. call the Exclusivity Condition. Informally, for a pair of nodes  $\{x, y\}$ , if  $x$  dominates  $y$  then  $x \not\prec y$  and  $y \not\prec x$ . If  $x \prec y$ , then neither  $x$  nor  $y$  dominates the other.

The precedence relation is both transitive and symmetric, characteristics described in (7). Transitivity ensures that all of the nodes in the precedence relation must be ordered with respect to each other. Asymmetry, in conjunction with transitivity, ensures that a node may not precede itself, either directly or indirectly.

- (7) a. Transitivity: A relation  $R$  is transitive if and only if for all ordered pairs  $\langle x, y \rangle$  and  $\langle y, z \rangle$  in  $R$ , the pair  $\langle x, z \rangle$  is also in  $R$ .  
 b. Asymmetry: A relation  $R$  is asymmetric if and only if for every ordered pair  $\langle x, y \rangle$  in  $R$ , the ordered pair  $\langle y, x \rangle$  is not in  $R$ .

Precedence, together with dominance and the exclusivity relation, allows Partee et al. to define a notion of sibling precedence, which states that siblings are in the precedence relation. For concreteness, I will adopt the definition given in (8). Note that siblings are also ordered pairs. By convention, the preceding sibling is drawn to the left of the succeeding one.

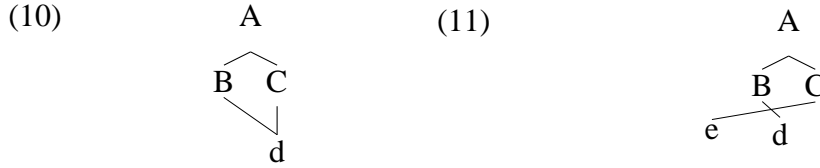
- (8) For a pair of nodes  $x$  and  $y$ ,  $x$  and  $y$  are siblings iff there is some node  $z$  which immediately dominates both  $x$  and  $y$  and if  $x \prec y$ .

Finally, Partee et al. define the nontangling condition, given in (9). Given the structure (6), the nontangling condition, along with precedence, dominance, and the other conditions, yields the string of terminals:  $c d f h i$ .

- (9) **The Nontangling Condition:** In any well-formed constituent structure tree, for any nodes  $x$  and  $y$ , if  $x \prec y$ , then all nodes dominated by  $x$  precede all nodes dominated by  $y$ .

The nontangling condition excludes structures such as those in (10) and (11). (10) is ruled out because  $d$  would be required to precede itself as it is the child of

two nodes in the precedence relation, while precedence is defined as asymmetric. (11) is excluded because  $d$  should precede  $e$ , yet  $e$  precedes  $d$  as depicted—the edges are crossed. The structures in (10) and (11) violate the what Partee et al. correctly identify as “defining” and “essential” properties of trees: in (10), node  $d$  has two parents, nodes  $B$  and  $C$ , while in (11), the edges between  $C$  and  $e$  and between  $B$  and  $d$  are tangled. However, as Sarkar and Joshi (1996) note, multiple dominance structures are not trees but acyclic graphs, and the configurations in (10) and (11) are intrinsic to multiple dominance structures.



In the multiple dominance structure (3), the admission of multiply dominated nodes, such as  $D$  and  $G$ , will yield asymmetry violations under the Nontangling condition, as we saw with (10). Terminal  $d$  would precede itself, being dominated by both  $D$  and  $E$ . (3) also contains tangled edges: as  $G$  is dominated by preceding sibling  $B$  it should precede the children of the succeeding sibling  $C$ , including the terminal  $h$ . Yet  $G$  must also succeed  $h$ , as it is the child of succeeding sibling  $I$ . The edges in (3) are thus necessarily tangled, and multiple dominance structures are in principle unlinearizable by the nontangling condition.

### 3 The Revised Nontangling Condition

In light of this limitation of the nontangling condition, I will propose in this section a linearization algorithm, based on that of Partee et al., that is capable of linearizing multiple dominance structures, including left and right sharing, and movement as multiple dominance. In addition to revisions to the nontangling condition itself, a novel structural relation is introduced, and other well-known relations are modified.

Some structural relations outlined by Partee et al. will be carried over unchanged. Precedence remains as described above, a transitive asymmetric relation between two nodes, written  $x \prec y$ . Likewise, the exclusivity condition is as above.

Dominance and immediate dominance are slightly modified, as given in (12) below. Dominance makes reference to a *path*, which is a chain of dominance relations. I assume that a path includes its endpoints: the path from  $x$  to  $y$  includes nodes  $x$  and  $y$ . The definitions in (12) also make explicit reference to the possibility of multiple paths between any two given nodes; this will become important in the discussion of the parent dominance relation. As our primary interest here is the linearization of terminals, it will be useful to define functions which return sets of terminals: the function  $d(x)$  returns the set of terminals dominated by node  $x$ .

- (12) a. **Dominance:** A node  $x$  dominates a node  $y$  if there is at least one path extending from  $x$  to  $y$ .
- b. **Immediate Dominance:** A node  $x$  immediately dominates a node  $y$  if  $x$  dominates  $y$ , and for at least one path from  $y$  to the root that includes  $x$ , there is no node  $z$  such that  $z$  dominates  $y$  and is dominated by  $x$ .

In the multiple dominance structure (3),  $B$  dominates nodes  $B$ ,  $(D)$ ,  $d$ ,  $E$ ,  $(G)$ , and  $g$ .  $d(B)$  returns the set  $\{d, g\}$ . Similarly,  $I$  immediately dominates nodes  $J$ ,  $(G)$ , and itself. The root node  $A$  dominates the terminal  $g$  through two different paths. One path is the chain from  $g$  through  $(G)$ ,  $C$ ,  $I$ , and ending in  $A$ , while the other begins with  $g$  but passes through  $(G)$ ,  $E$ ,  $B$ , and ends in  $A$ .

This definition of path entails that dominance is a reflexive relation: the path from  $x$  to  $x$  includes  $x$ . It also follows that a node  $x$  dominated by  $y$  may be dominated by a node which does not dominate or is not dominated by  $y$ . There may be some path from node  $x$  which does not pass through  $y$ . In (3), node  $G$  is dominated by  $B$  and also by  $C$ , though  $B$  and  $C$  are not in any dominance relation.

Immediate dominance is also reflexive: no distinct node intervenes between node  $x$  and itself. This characteristic requires that multiple and single dominance be modified slightly, as given in (13). It is also worth reiterating that children of multiply dominated nodes are not necessarily themselves multiply dominated.

- (13) a. **Multiple Dominance:** A node  $x$  is multiply dominated if it is immediately dominated by more than two nodes
- b. **Single Dominance:** A node  $x$  is singly dominated if it is immediately dominated by one or two nodes

The notion of sibling precedence given in (8) are carried over from Partee et al. 1990. In multiple dominance structures, such as that in example (3), some nodes may have more than one sibling. Node  $(G)$  has two siblings:  $(D)$  and  $J$ . Note however that siblinghood is not transitive;  $(D)$  and  $J$  are not siblings because there is no node that immediately dominates them both.

Along with dominance and immediate dominance, the relations full dominance and parent dominance are also necessary. Full dominance has been described in various formulations in the multiple dominance literature, e.g. in Wilder 2008. Here it is defined as in (14). The set of terminals fully dominated by a node  $x$  is denoted by the function  $fd(x)$ .

- (14) **Full Dominance:** A node  $x$  fully dominates node  $y$  iff every path from  $y$  to the root passes through  $x$ .

In (3), the subtree rooted by  $(G)$  is dominated by nodes  $A$ ,  $B$ ,  $E$ ,  $C$ ,  $I$ , and  $(G)$ . The only nodes that fully dominate  $(G)$  are the root node  $A$  and node  $(G)$  itself. Node  $A$  fully dominates  $(G)$  because all paths to the root node must pass through

$A$ , as  $A$  is the root. Similarly,  $G$  fully dominates itself because all paths from  $G$  to the root must pass through  $G$ .

Parent Dominance, defined in (15), is a novel dominance relation. The set of terminals parent dominated by a node  $x$  is denoted by the function  $pd(x)$ .

- (15) **Parent Dominance:** A node  $x$  parent dominates node  $y$  iff  $x$  dominates  $y$  and no node on any path from  $y$  to  $x$  is sibling to a node dominating  $x$ .

In (3), node  $B$  parent dominates node  $d$ . There are two paths from  $d$  to  $B$ : one from  $d$  through  $(D)$  to  $B$  and another from  $d$  through  $(D)$  and  $E$  to  $B$ . No node on either of these paths has a sibling that dominates  $B$ . Node  $B$  also parent dominates nodes  $(G)$  and  $g$ . Thus  $pd(B)$  yields the set  $\{d, g\}$ . Turning to node  $E$ , it parent dominates nodes  $(G)$  and  $g$ ; however, it does not parent dominate nodes  $(D)$  or  $d$  because  $(D)$  is sibling to  $E$ , which dominates itself.  $fd(E)$  therefore yields  $\{g\}$ .

In addition to the relations adopted above, I propose the revised nontangling condition, given in (16).<sup>1</sup> The condition dictates precedence relations between sets of terminals on the basis of the multiple or single dominance status of siblings. It is interesting to note that the revised nontangling condition does not make reference to a “conjunct” at all, as it operates on purely structural information, completely abstracted from category information. The application of the revised nontangling condition to a syntactic structure is presented in the form of a table. The left column delineates all of the sibling relations in the structure, while the middle column identifies the functions which return the relevant sets of terminals. The right column lists these sets of terminals in the precedence relations dictated by the algorithm.

- (16) **Revised Nontangling Condition:**

For all siblings  $\langle x, y \rangle$ :

- a. if  $x$  and  $y$  are both singly dominated then  $fd(x) \prec fd(y)$
- b. if  $x$  and  $y$  are both multiply dominated then  $pd(x) \prec pd(y)$
- c. if  $x$  is multiply dominated and if  $y$  is singly dominated then  $fd(x) \prec pd(y)$
- d. if  $x$  is singly dominated and if  $y$  is multiply dominated then  $pd(x) \prec fd(y)$

Table 1 gives the output of the algorithm for example (3). The siblings  $\langle B, C \rangle$  are both singly dominated, so the fully dominated terminals of  $B$ , i.e.  $d$ , precede

---

<sup>1</sup> Though it does not figure into this discussion, the notion of c-command can be revised to accommodate multiple dominance structures, as given in (i), to ensure that a moved element is c-commanded only at the highest position it occupies.

- i. **C-command:** A node  $x$  c-commands node  $y$  if the sibling of  $x$  parent dominates  $y$ .

Table 1: Sibling and Terminal precedence relations for (3)

Sibling Precedence	Terminal Relations	Terminal Precedence
$B \prec C$	$fd(B) \prec fd(C)$	$d \prec h, j$
$(D) \prec E$	$fd((D)) \prec pd(E)$	$d \prec g$
$(D) \prec (G)$	$pd((D)) \prec pd(G)$	$\emptyset \prec g$
$H \prec I$	$fd(H) \prec fd(I)$	$h \prec j$
$J \prec (G)$	$pd(J) \prec fd((G))$	$j \prec g$
Final Linearization:		$d h j g$

those of  $C$ , i.e.  $h$  and  $j$ ; neither  $B$  nor  $C$  fully dominates  $g$ . For the siblings  $\langle (D), E \rangle$ ,  $E$  is singly dominated, while  $(D)$  is multiply dominated; therefore  $fd((D)) \prec pd(E)$ .  $g$  is parent dominated by  $E$ , but  $d$  is not. The path between  $d$  and  $E$  contains  $(D)$ , which is sibling to  $E$  and dominates  $d$ . Thus,  $d \prec g$ . In the pair  $\langle (D), (G) \rangle$ , both siblings are multiply dominated, so it is the parent dominated terminals of  $(D)$  and  $(G)$  that are ordered. However  $(D)$  does not parent dominate any terminals: there is a sibling on the path from  $d$  to  $(D)$ , namely  $(D)$  itself, that has a sibling,  $E$ , which dominates  $d$ . Thus no ordering of terminals results from this sibling pair. The final linearization is the conjunction of these terminal precedence relations. I present here this conjunction simplified to the linearized string of terminals:  $d h j g$ .

Returning to the structure (4), it is clear that the revised nontangling condition is capable of linearizing both left and right sharing coordination constructions, as well as movement as multiple dominance. Table (2) outlines the sibling precedence relations, and the terminal precedence relations as dictated by the revised nontangling condition. Instead of walking through every pair, I will simply point out several siblings that contribute key precedence relations to the final linearization.

As both of the siblings in the pair  $\langle CP, Conj' \rangle$  are singly dominated, it is their fully dominated terminals which are linearized, yielding *brine*  $\prec$  *and, bard*. Between the pair  $\langle (DP), T' \rangle$  in the left conjunct,  $(DP)$  is multiply dominated, while  $T'$  is singly dominated, and so it is the fully dominated terminals of the former, *Alexi*, which precede the parent dominated terminals of the latter: *should, brine, the, turkey, for, Thanksgiving*. The terminal *should* precedes the vP due to the pair  $\langle (T), vP \rangle$ . The siblings  $\langle vP, (PP) \rangle$  yield the vP preceding the adjunct PP, and the verb *brine* precedes its argument due to  $\langle (v/V), VP \rangle$ . The structural relations in the right conjunct are similar, and the final linearization is precisely as expected: right shared elements appear in the right conjunct, left shared elements surface in the left and moved elements appear at their highest moved position.



Table 2: Sibling and Terminal precedence relation for example (4)

Sibling Precedence	Terminal Relations	Terminal Precedence
$CP \prec Conj'$	$fd(CP) \prec fd(Conj')$	brine $\prec$ and, bard
$C \prec TP$	$fd(C) \prec fd(TP)$	$\emptyset \prec$ brine
$(DP) \prec T'$	$fd((DP)) \prec pd(T')$	Alexi $\prec$ should, brine, the, turkey, for, Thanksgiving
$(T) \prec vP$	$fd((T)) \prec pd(vP)$	should $\prec$ brine, the, turkey, for, Thanksgiving
$vP \prec (PP)$	$pd(vP) \prec fd((PP))$	brine, the, turkey $\prec$ for, Thanksgiving
$P \prec DP$	$fd(P) \prec fd(DP)$	for $\prec$ Thanksgiving
$(DP) \prec v'$	$fd((DP)) \prec pd(v')$	Alexi $\prec$ brine, the, turkey
$(v/V) \prec VP$	$fd((v/V)) \prec pd(VP)$	brine $\prec$ the, turkey
$(v/V) \prec (DP)$	$pd((v/V)) \prec pd((DP))$	$\emptyset \prec$ the, turkey
$D \prec NP$	$fd(D) \prec fd(NP)$	the $\prec$ turkey
$Conj \prec CP$	$fd(Conj) \prec fd(CP)$	and $\prec$ bard
$C \prec TP$	$fd(C) \prec fd(TP)$	$\emptyset \prec$ bard
$(DP) \prec T'$	$fd((DP)) \prec pd(T')$	Alexi $\prec$ should, bard, the, turkey, for, Thanksgiving
$(T) \succ vP$	$fd((T)) \prec pd(vP)$	should $\prec$ bard, the, turkey, for, Thanksgiving
$vP \prec (PP)$	$pd(vP) \prec fd((PP))$	bard, the, turkey $\prec$ for, Thanksgiving
$(DP) \prec v'$	$fd((DP)) \prec pd(v')$	Alexi $\prec$ bard, the, turkey
$(v/V) \prec VP$	$fd((v/V)) \prec pd(VP)$	bard $\prec$ the, turkey
$(v/V) \prec (DP)$	$pd((v/V)) \prec pd((DP))$	$\emptyset \prec$ the, turkey
Final Linearization:	Alexi should brine and bard the turkey for Thanksgiving.	

#### 4 Comparison with Linear Correspondence Axiom based approaches

The linearization algorithm of Kayne (1994), the Linear Correspondence Axiom (LCA), has been broadly applied in syntactic theory, and so it is worth briefly comparing the revised nontangling condition with the LCA and two revisions of the LCA, that of Wilder (2008) and that of Gracanin-Yuksek (To appear).

The LCA eschews the notion of sibling precedence, in favour of asymmetric c-command to derive precedence relations between terminals. In essence, the terminals dominated by a node  $X$  precede those terminals dominated by the nodes

asymmetrically c-commanded by  $X$ . Like the original nontangling condition, the LCA was not designed to accommodate multiple dominance structures. As noted by Sabbagh (2007), these structures pose a problem for the LCA, in that, if a node  $y$  is dominated both by  $X$  and by a node asymmetrically c-commanded by  $X$ , it must precede itself, yielding an asymmetry violation.

To permit linearization of multiple dominance structures, Wilder (2008) modified the LCA by introducing a notion of full dominance: essentially, the terminals fully dominated by  $X$  precede those fully dominated by nodes asymmetrically c-commanded by  $X$ . However, several aspects of this analysis are problematic. First, as Wilder notes, the revised LCA is unable to linearize many examples of movement as multiple dominance, thus limiting the application of multiple dominance structures to the relatively rare sharing coordination constructions. Second, the revised LCA requires that left sharing constructions be analyzed *ex situ*. That is, a left shared element must be moved out of the coordinate structures in order to be linearized. Therefore, left shared elements are singly dominated, as movement is not analyzed as multiple dominance. However, examples such as those in (17) demonstrate that such an analysis would require the ConjP to exhibit the bizarre behaviour of taking intermediate level projections as complement and specifier. Finally, if right adjoining is a permitted syntactic structure, then structures such as (1), with right shared adjuncts in combination with another right shared element, e.g. an argument or another adjunct, are unlinearizable. If we assume that adjuncts are asymmetrically c-commanded by their hosts, these examples are unlinearizable because the shared material dominated by the host is, by definition, not *fully* dominated by the host and thus will not be linearized with respect to the adjunct material.

- (17) a. What [ $C'$  will Alexi cook] and [ $C'$  won't Tim eat]?  
 b. Tim [ $T'$  has called] and [ $T'$  hasn't told him the truth].

Gracanin-Yuksek (To appear) has also modified the LCA to accommodate multiple dominance structures. Gracanin-Yuksek adopts Wilder's changes to the LCA, adapts a version of full dominance, and further modifies the definition of c-command with notions of highest mother, highest sister, and shortest path. These changes permit the linearization of sharing coordination and movement analyzed as multiple dominance, but again, some serious caveats apply. Gracanin-Yuksek's algorithm does not actually give precedence relations, only "ordering" relations which may correspond either with precedence or subsequence. No indication is given as to how this is to be resolved. Furthermore, this revised LCA requires that right shared adjuncts, and only adjuncts, raise out of the coordinate structure. Not only are we not provided with independent motivation as to why only adjuncts instead of e.g. arguments must move, but arguments have also been provided against such an *ex situ* analysis, see for example Abels (2004).

In this brief comparison, certain merits of the revised nontangling condition are clear. Whereas the revised nontangling condition can linearize all kinds of sharing

coordination constructions and movement as multiple dominance, Wilder's revised LCA is wanting in several empirical and conceptual respects and that of Gracanin-Yuksekk falls short of providing a complete linearization algorithm, in addition to requiring controversial analyses of shared adjuncts.

## 5 The Peripherality Condition

In addition to linearizing sharing coordination constructions and movement as multiple dominance, the revised nontangling condition also constrains the possible configurations of multiple dominance structures. Here I discuss one aspect of this constraint: that any shared material in a sharing coordination construction must appear at the periphery of its conjunct. This *peripherality condition* is stated in (18). Though not all sharing coordination construction analyses derive the peripherality condition, e.g. Vries (2009), the existence of some sort of peripherality constraint has been recognized at least since Oirsouw (1987). Interestingly, the peripherality condition in (18) differs from that in other recent works, e.g. Sabbagh (2007) and Wilder (2008).

### (18) Peripherality Condition:

In the configuration:

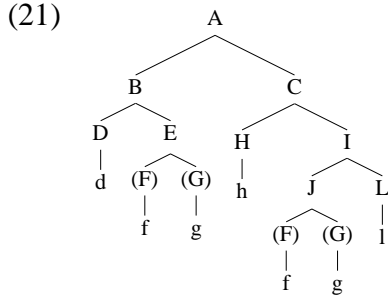
[[A...X...] Conj. [B...X...]]

if *X* is left shared, then it must be at the left edge of A and if *X* is right shared then it must be at the right edge of B (adapted from Sabbagh 2007).

The peripherality condition dictates that shared material appear at the edge of the conjunct. Contrasting the sentences in (19), we see the example become ungrammatical if the shared element is followed by non-shared material. Likewise, in the ungrammatical (20b), the shared *Spencer* is preceded by the non-shared *What did*; compare with the grammatical (20a) where the shared material is peripheral.

- (19) a. Alexi likes and Angela hates **espresso**.
- b. \* Alexi likes and Angela hates **espresso** in the evening.  
(Under reading where *in the evening* does not modify *likes*)
- (20) a. **What did Spencer** cook and grill?
- b. \* **What did Spencer** barbecue and what did grill?

(21) illustrates the structures that the peripherality condition is designed to rule out: shared nodes (*F*) and (*G*) are not peripheral. Such examples are unlinearizable; *f* and *g* are not linearized with respect to the other terminals. At the left periphery, the problem lies with the siblings  $\langle D, E \rangle$ . As both of these nodes are singly dominated, the revised nontangling condition dictates that  $fd(D) \prec fd(E)$ . But, as neither *f* nor *g* are fully dominated by *E*, these nodes are never ordered with respect to *d*. Similarly, the siblings  $\langle J, L \rangle$  fail to order *f* and *g* with *l*.



This example can also illustrate how the revised nontangling condition predicts that the shared element need not be peripheral in the conjunct where it does not surface. As  $H$  and  $I$  are both singly dominated, they yield  $fd(H) \prec fd(I)$ .  $f$  is not in  $fd(I)$  and is thus not ordered with respect to  $h$ . Thus, shared element  $(F)$  tolerates non-peripherality within the right conjunct.

Recently, Sabbagh proposed a more restrictive formulation of the right peripherality condition, simplified somewhat and given in (22) (Sabbagh 2007). This stronger condition can be used to rule out examples such as (23), where the shared element is right peripheral, but the gap is not.

(22) **Right Edge Restriction**

In  $[[A \dots X \dots] \text{ Conj. } [B \dots X \dots]]$ ,  $X$  must be rightmost within  $A$  and  $B$ .

(23) \* Alexi likes \_\_\_ with milk and Angela hates **espresso**.

The revised nontangling condition does not rule out these cases, as it concerns the peripherality of the shared element, not the gap. I would suggest however, that examples such as (23) should be ruled out due to the constraints on prosodic and information structure. Féry and Hartmann (2005) argue that certain coordinate structures, including right sharing and gapping, must contain contrastively focused elements that immediately precede the coordinator and the shared element. However, in examples such as (23), the element immediately preceding the coordinator, i.e. *with milk*, is not semantically contrastive with the element immediately preceding the shared element, i.e. *hates*. Thus, examples where the gap appears to be non-peripheral will be ruled out, and Sabbagh's stronger right edge constraint appears unnecessary. While I leave for future work a more detailed study of the interaction of linearization constraints and focus and syntactic parallelism, it is interesting that the constraints proposed by Féry and Hartmann (2005) are independently motivated for gapping, yet complement the constraints on sharing constructions induced by this linearization algorithm.

Another formulation of the right peripherality condition comes from Wilder (2008), who claims that for a shared element  $x$ , the gap corresponding to  $x$  must be at the right edge of the non-final conjunct, providing examples such as (24) as support. However, it is not clear that (24) is a typical case of right sharing. Ha (2008) suggests that these examples may be due to some sort of reanalysis of the

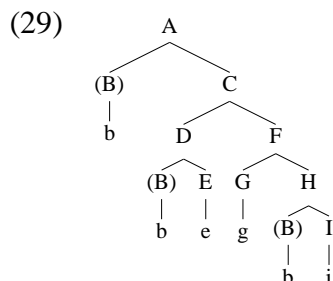
verbs as complex predicates. Compare (24) with the degraded examples in (25), where the verbs cannot be easily understood as members of a complex event. Likewise, these types of examples are impossible with distinct subjects, as in (26). The unacceptability of these examples is unexpected if the right edge constraint were to generally allow non-peripherality of right shared elements in the right conjunct.

- (24) **John** should fetch \_\_\_ and give **the book** to Mary
- (25) a. \* **Mary** congratulated \_\_\_ and gave **the winner** a prize.  
 b. ?\* **John** should critique \_\_\_ and give **the book** to Mary.
- (26) \* John should fetch \_\_\_ and Peter will give **the book** to Mary

I remarked earlier that recent research has focused on the right peripherality condition, as these authors assume some form of the small conjunct hypothesis, which renders a left peripherality condition unnecessary. Any shared material which originates within, and is subsequently moved out of, the coordinate structure will necessarily appear at or past the periphery of the coordinate structure. Any material which is merged outside of the coordinate structure will presumably take scope over or apply to both conjuncts, thus also giving the appearance of being shared. In (27), the left shared elements *What did* have raised out of the coordinate structure, and thus naturally appear at the left periphery. (28) would be ruled out by whatever device ensures that left shared material raise out of the coordinate structure.

- (27) [<sub>CP</sub> **What did** [<sub>ConjP</sub> [<sub>TP</sub> Spencer barbecue ] and [<sub>TP</sub> his friends eat]]]?  
 (28) \* [<sub>ConjP</sub> [<sub>CP</sub> **What did** **Spencer** barbecue] and [<sub>CP</sub> what did \_\_\_ grill]]?

However, once the large conjunct hypothesis is assumed, a left peripherality condition is necessary to rule out examples like (28). As previously noted, the revised nontangling condition derives the left peripherality condition. What was mentioned only briefly in the introduction is that the revised nontangling condition is also compatible with *ex situ* analyses and the small conjunct hypothesis. A schematic example will suffice to illustrate. In (29), take the subtrees (*D*) and (*H*) to be the conjuncts. (*B*), then, is a shared element which has raised out of the coordinate structure.  $b \prec e, g, i$  as a result of  $\langle (B), C \rangle$ .



The proper analysis of sharing coordination constructions still enjoys much debate in the literature, and I take it as an advantage of the revised nontangling condition that it can linearize both *ex* and *in situ* analyses and both large and small conjuncts. This flexibility will allow the complex facts at work in this debate, instead of the formalism, to dictate the analysis. Alternatively it could be said that the robustness of this analysis predicts that both large and small conjunct hypotheses and both *ex* and *in situ* analyses are in principle possible. Thus, it could be that the complexities in the data result from some underlying structural ambiguity.

## 6 Conclusion

This paper has explored a revision of the nontangling condition, Partee et al. 1990, to linearize sharing coordination constructions and movement as multiple dominance. Several structural relations, including dominance and full dominance, have been modified and the novel relation parent dominance has been introduced to suit this purpose. The nontangling condition has also been modified, with the net result being that a host of multiple dominance constructions are rendered linearizable. I briefly compare these results with those of other algorithms designed to linearize multiple dominance structures, and conclude that the revised nontangling condition compares favorably. Certain configurations of multiple dominance structures are categorically excluded by the revised nontangling condition, including structures which violate the peripherality condition. I discuss how this condition is derived in this proposal, and compare it to other formulations of the peripherality condition.

## References

- Abels, Klaus. 2004. Right Node Raising: Ellipsis or Across the Board Movement? In Keir Moulton and Matthew Wolf, eds., *Proceedings of the North East Linguistic Society 34*, volume 1, 45–60, University of Massachusetts at Amherst: Graduate Linguistic Student Association.
- Féry, Caroline and Katherina Hartmann. 2005. The Focus and Prosodic Structure of German Right Node Raising and Gapping. *The Linguistic Review* 22(1):69–116.
- Gracanin-Yukse, Martina. To appear. Linearizing Multidominance Structures. In Theresa Biberauer and Ian Roberts, eds., *Challenges to Linearization*, Berlin: Mouton de Gruyter.
- Ha, Seungwan. 2008. Ellipsis, Right Node Raising and Across-The-Board Constructions. Ph.D. thesis, Boston University.
- Johannessen, Janne Bondi. 1998. *Coordination*. Oxford University Press.

*A Sibling Precedence Approach to Linearization*

- Kayne, Richard S. 1994. *The Antisymmetry of Syntax*. Cambridge, Massachusetts: MIT Press.
- Nunes, Jairo. 2001. Sideward Movement. *Linguistic Inquiry* 32(2):303–344.
- Oirsouw, Robert R. van. 1987. *The Syntax of Coordination*. New York, New York: Croom Helm.
- Partee, Barbara Hall, Alice G. B. ter Meulen, and Robert Eugene Wall. 1990. *Mathematical Methods in Linguistics*. Dordrecht; Boston: Kluwer Academic.
- Sabbagh, Joseph. 2007. Ordering and Linearizing Rightward Movement. *Natural Language and Linguistic Theory* 25(2):349–401.
- Sarkar, Anoop and Aravind Joshi. 1996. Coordination in Tree Adjoining Grammars: Formalization and Implementation. In *Proceedings of COLING'96*, 610–615, Copenhagen.
- Starke, Michal. 2001. Move Dissolves into Merge: A Theory of Locality. Ph.D. thesis, University of Geneva.
- Vries, Mark de. 2009. On Multidominance and Linearization. *BIOLINGUISTICS* 3(4):344.
- Wilder, Chris. 1997. Some Properties of Ellipsis in Coordination. In Artemis Alexiadou and T. Hall, eds., *Studies on Universal Grammar and Typological Variation*, 59–107, Amsterdam: Benjamins.
- Wilder, Chris. 2008. Shared Constituents and Linearization. In Kyle Johnson, ed., *Topics in Ellipsis*, 229–258, Cambridge, United Kingdom: Cambridge University Press.

David Potter  
Department of Linguistics  
8888 University Drive  
Simon Fraser University  
Burnaby, BC V5A 1S6 Canada

dkp1@sfu.ca